

Measurements of WHT Primary Mirror reflectivity before and after CO₂ cleaning, Tel at AP3
 Taken by Neil O'Mahony using SMS micro-Scan reflectometer
 CO₂ cleaning follows calima dust event on 18 April. Photos of dust accumulated in mirror cell
 Successive measurements with similar scattering measurements are in same location
 %R exceeding specification repeatability of 0.5% are marked "skip" & omitted from average
 Ref are measurements of MG reference mirror, typically 91-93% using SMS

Lambda	0.67 micron	<--SMS Summary characteristics
Incident Angle	25 deg	
BW Limits	1 0.01	

First, measurements before CO₂ cleaning

datum #	Scattering at angles Θ, Φ			Reflectivity	user comment	Roughness RMS(\AA)	TIME	DATE
	Θ s->	0	50					
1	location 1	7.68E-03	4.80E-03	0.841		63.6	10:57:08	04-20-1912
2		7.70E-03	4.79E-03	0.842		63.6	10:57:14	04-20-1912
3	2	7.07E-03	3.43E-03	0.849		61.3	10:57:27	04-20-1912
4		7.05E-03	3.42E-03	0.85		61.2	10:57:32	04-20-1912
5	3	8.06E-03	3.46E-03	0.832		66.7	10:57:47	04-20-1912
6		8.17E-03	3.51E-03	0.827		67.3	10:57:53	04-20-1912
7	4	6.42E-03	3.58E-03	0.845		58.2	10:58:15	04-20-1912
8		6.37E-03	3.56E-03	0.845		58	10:58:20	04-20-1912
9	5	8.17E-03	4.36E-03	0.839		66	10:58:31	04-20-1912
10		8.19E-03	4.35E-03	0.839		66.1	10:58:36	04-20-1912
11	6	6.84E-03	3.91E-03	0.844		60	10:58:46	04-20-1912
12		6.81E-03	3.92E-03	0.845		59.9	10:58:51	04-20-1912
13		7.10E-03	3.75E-03	0.849	skip	61.2	10:59:22	04-20-1912
14		7.08E-03	3.57E-03	0.877	skip	60.2	10:59:27	04-20-1912
15	7	6.94E-03	3.44E-03	0.846		60.8	10:59:37	04-20-1912
16		7.33E-03	3.48E-03	0.848		62.5	10:59:48	04-20-1912
17		7.17E-03	3.44E-03	0.84		62.1	10:59:53	04-20-1912
18	8	7.17E-03	3.43E-03	0.842		62	11:00:00	04-20-1912
19		6.33E-03	3.37E-03	0.84		58.1	11:00:50	04-20-1912

mean of valid ms **7.24E-03 3.77E-03 0.842** **62.0** before CO₂ cleaning
 std dev **0.005852**
 std err **0.002069**

Comment: indicators show mirror in worse condition than on March 22

Measurements after CO₂ cleaning follow:

20	1	2.46E-03	5.51E-04	0.839	skip	40.4	11:34:01	04-20-1912
21		2.35E-03	5.29E-04	0.855		39.2	11:34:06	04-20-1912
22		2.36E-03	5.28E-04	0.851		39.3	11:34:12	04-20-1912
23	2	2.34E-03	5.88E-04	0.868		37.8	11:34:32	04-20-1912
24		2.33E-03	5.71E-04	0.868		37.9	11:34:38	04-20-1912
25	3	2.41E-03	5.99E-04	0.86		38.6	11:34:46	04-20-1912
26		2.39E-03	5.97E-04	0.867		38.2	11:34:51	04-20-1912
27		2.39E-03	5.99E-04	0.864		38.3	11:34:57	04-20-1912

28	4	2.27E-03	6.20E-04	0.864	36.7	11:35:11	04-20-1912
29		2.27E-03	6.23E-04	0.864	36.6	11:35:17	04-20-1912
30	5	2.26E-03	4.70E-04	0.868	38.8	11:35:25	04-20-1912
31		2.22E-03	4.69E-04	0.868	38.4	11:35:31	04-20-1912
32	6	2.78E-03	6.79E-04	0.861	41.6	11:35:42	04-20-1912
33		2.79E-03	6.80E-04	0.86	41.7	11:35:47	04-20-1912
34	7	2.34E-03	3.75E-04	0.862	43.2	11:36:11	04-20-1912
35		2.34E-03	3.75E-04	0.868	43.1	11:36:17	04-20-1912
36		2.34E-03	3.78E-04	0.871	42.9	11:36:24	04-20-1912
37	8	1.13E-02	2.78E-03	0.842	84.8	11:36:35	04-20-1912
38		1.12E-02	2.71E-03	0.845	84.6	11:36:40	04-20-1912
39	9	2.73E-03	5.04E-04	0.87	44.2	11:36:49	04-20-1912
40		2.74E-03	5.00E-04	0.87	44.4	11:36:54	04-20-1912
41	10	2.29E-03	4.12E-04	0.866	40.9	11:37:03	04-20-1912
42		2.29E-03	4.10E-04	0.865	41	11:37:08	04-20-1912
43	11	7.83E-03	1.85E-03	0.853	70.6	11:37:38	04-20-1912
44		7.82E-03	1.84E-03	0.852	70.8	11:37:43	04-20-1912
45	12	2.77E-03	7.11E-04	0.867	41	11:37:51	04-20-1912
46		2.78E-03	7.15E-04	0.866	41	11:37:57	04-20-1912
47		2.82E-03	7.48E-04	0.866	41.1	11:38:06	04-20-1912
mean of valid ms		3.47E-03	8.00E-04	0.862	45.6		
std dev				0.008			
std err				0.002			

Measurements on reference mirror (lower than usual, but notice time gap w.r.t M1)

48		3.13E-03	2.11E-03	0.913	38.9	15:11:29	04-20-1912
49		3.15E-03	2.11E-03	0.913	39	15:11:34	04-20-1912
50		6.62E-03	4.78E-03	0.899	57	15:11:41	04-20-1912
51		3.05E-03	1.83E-03	0.916	38.4	15:13:02	04-20-1912
52		3.06E-03	1.84E-03	0.916	38.5	15:13:07	04-20-1912
53		2.81E-03	1.10E-03	0.916	37.8	15:13:14	04-20-1912
54		2.82E-03	1.10E-03	0.915	37.9	15:13:18	04-20-1912
55		6.31E-03	2.36E-03	0.91	57.1	15:13:25	04-20-1912

Conclusions: Reflectivity is remarkably high immediately after cleaning and may be even higher than indicated, given reference measurements are more than 1% lower than usual.

CO2 cleaning would therefore seem to have been unusually effective, all indicators showing mirror with less scattering & higher reflectivity than after cleaning of March 14th

Surface roughness measurement is similar to level of March 22.